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09/121,528	07/23/1998	GARO J. DERDERIAN	M4065.069/P0	3421

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EXAMINER

MEEKS, TIMOTHY HOWARD

ART UNIT

PAPER NUMBER

1762

DATE MAILED: 08/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/121,528

Applicant(s)

DERDERIAN, GARO J.

Examiner

Timothy H. Meeks

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 March 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4,6-10,12-36 and 46-68 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.

- 6) ☒ Claim(s) 1-4,6-10,12-36 and 46-68 is/are rejected.

- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.

- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114 was filed in this application after appeal to the Board of Patent Appeals and Interferences, but prior to a decision on the appeal. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 13 September 2001 has been entered.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 56-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baum et al. (5,783,716).

Baum et al. disclose a process for depositing platinum films comprising providing a precursor such as methylcyclopentadienyl trimethylplatinum to a chamber containing a substrate, along with an oxidizing gas, such as oxygen and nitrous oxide mixtures, and depositing the platinum film on a substrate at 200-300 C, said platinum film being useful for an electrode for DRAM (Example 6). The claimed substrates are disclosed at col. 7, lines 52-63.

Baum et al. are silent as to the flow rate at which the oxygen/nitrous oxide gas is delivered to the chamber. However, because this flow rate affects the amount of oxidizing gas mixture provided to the chamber for removal of carbon impurities and would also depend on the amount and type of platinum precursor delivered, deposition rate, etc. which factors determine how much carbon is present, the total flow rate of oxidizing gases to the chamber is a result effective parameter and it would have been a matter of routine experimentation to determine appropriate amounts (flow rates) of the oxidizing gases to provide to optimize removal of carbon from the film.

With respect to claims 61-68, Baum et al. disclose that higher precursor delivery rates are achieved when delivering the precursor by direct liquid injection rather than by using conventional bubbler systems which involve delivering the precursor by bubbling a non-reactive gas therethrough. However, because Baum et al. disclose at col. 1, lines 40-68 that conventional bubbler systems provide sufficient precursor delivery rates unless it is desired to form larger area platinum films with continuous coverage of surfaces of various geometries, it would have been obvious to have used conventional bubblers for delivery of the precursors for applications other than that listed by Baum et al. as being inadequate given the expectation of such delivery system being adequate for these applications.

Baum et al. are silent as to the deposition times and therefore do not explicitly disclose depositing for the claimed times. However, the amount of time spent depositing the coating and the thickness of the coating that is built up are clearly directly related and the thickness is a function of the intended purpose of the coating. Therefore, adjustment of these result effective

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parameters through routine experimentation for optimization would have been obvious, absent evidence showing the criticality of using the claimed values.

With respect to claims requiring certain ratios of oxygen to nitrous oxide, Baum et al. disclose that the purpose of the oxidizing gas is to remove carbon to facilitate DRAM production (col. 5, lines 27-47) and the relative amounts of the oxidizing gases in the process would affect this result. As such variation of this result effective parameter through routine experimentation, including to values in the claimed range, for optimization would have been obvious absent evidence showing the criticality of using the claimed values.

Please note that Baum et al. explicitly disclose at col. 7, lines 40-45 that that suitable "chemical vapor deposition conditions" for the platinum deposition "may readily be determined without undue experimentation by those of ordinary skill in the art". These "chemical vapor deposition conditions" would clearly include the reaction pressure, flow rates of reactants and carrier gases, deposition times, ratios of reactants to each other and to carrier gases, etc. The examiner maintains, as set forth above, and as explicitly stated by Baum et al. that these conditions are readily determined through routine experimentation for optimization. Therefore, using values within the claimed ranges for these conditions would have been prima facie obvious in the absence of evidence which shows a criticality for using the claimed values.

Claims 61-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baum et al. (5,783,716) in view of Kwon et al.

Baum et al. disclose a process for depositing platinum films comprising providing a precursor such as methylcyclopentadienyl trimethylplatinum to a chamber containing a substrate,

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along with an oxidizing gas, such as oxygen and nitrous oxide mixtures, and depositing the platinum film on a substrate at 200-300 C, said platinum film being useful for an electrode for DRAM (Example 6). The claimed substrates are disclosed at col. 7, lines 52-63.

Baum et al. are silent as to the flow rate at which the oxygen/nitrous oxide gas is delivered to the chamber. However, because this flow rate affects the amount of oxidizing gas mixture provided to the chamber for removal of carbon impurities and would also depend on the amount and type of platinum precursor delivered, deposition rate, etc. which factors determine how much carbon is present, the total flow rate of oxidizing gases to the chamber is a result effective parameter and it would have been a matter of routine experimentation to determine appropriate amounts (flow rates) of the oxidizing gases to provide to optimize removal of carbon from the film.

Baum et al. disclose that higher precursor delivery rates are achieved when delivering the precursor by direct liquid injection rather than by using conventional bubbler systems which involve delivering the precursor by bubbling a non-reactive gas therethrough. However, because Baum et al. disclose at col. 1, lines 40-68 that conventional bubbler systems provide sufficient precursor delivery rates unless it is desired to form larger area platinum films with continuous coverage of surfaces of various geometries, and because Kwon et al. disclose that using a bubbler with argon inert carrier gas to deliver the same platinum precursor as that used by Baum et al. is effective for depositing a platinum film for an electrode of a memory cell (abstract; experimental), it would have been obvious to use a bubbler to deliver the precursor of Example 6 of Baum et al. for forming an electrode for a memory cell because doing so would have been expected to be effective.

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The other differences with respect to result effective parameters are obvious for the reasons set forth above.

Claims 1-4, 6-10, 12-23, 26-36, and 46-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baum et al. (5,783,716) in view of Kwon et al. and Chen et al. (Applied Physics Letters).

Baum et al. disclose a process for depositing platinum films comprising providing a precursor such as methylcyclopentadienyl trimethylplatinum to a chamber containing a substrate, along with an oxidizing gas, such as oxygen and nitrous oxide mixtures, and depositing the platinum film on a substrate at 200-300 C, said platinum film being useful for an electrode for DRAM (Example 6). The claimed substrates are disclosed at col. 7, lines 52-63.

Baum et al. are silent as to the pressure in the deposition chamber during deposition. However, because Baum et al. do not limit the deposition pressure and because Kwon et al. and Chen et al. disclose that deposition pressures of 2 Torr and atmospheric, respectively, are effective deposition pressures for depositing Pt films by CVD using the precursors disclosed by Baum et al. (see Kwon at page 2849 and Chen at page 1591), it would have been obvious to have used deposition pressures in this range (2 Torr to atmospheric (760 Torr)) which overlaps with the claimed ranges because these deposition pressures would have been expected to be effective for depositing the platinum films by CVD with these precursors, especially in the absence of objective evidence which shows an unexpected result derived from using pressures in the claimed ranges.

Baum et al. are silent as to the flow rate at which the oxygen/nitrous oxide gas is delivered to the chamber. However, because this flow rate affects the amount of oxidizing gas mixture provided to the chamber for removal of carbon impurities and would also depend on the amount and type of platinum precursor delivered, deposition rate, etc. which factors determine how much carbon is present, the total flow rate of oxidizing gases to the chamber is a result effective parameter and it would have been a matter of routine experimentation to determine appropriate amounts (flow rates) of the oxidizing gases to provide to optimize removal of carbon from the film.

With respect to claims 6-36, Baum et al. disclose that higher precursor delivery rates are achieved when delivering the precursor by direct liquid injection rather than by using conventional bubbler systems which involve delivering the precursor by bubbling a non-reactive gas therethrough. However, because Baum et al. disclose at col. 1, lines 40-68 that conventional bubbler systems provide sufficient precursor delivery rates unless it is desired to form larger area platinum films with continuous coverage of surfaces of various geometries, it would have been obvious to have used conventional bubblers for delivery of the precursors for applications other than that listed by Baum et al. as being inadequate given the expectation of such delivery system being adequate for these applications. Alternatively, because Kwon et al. disclose that using a bubbler with argon inert carrier gas to deliver the same platinum precursor as that used by Baum et al. is effective for depositing a platinum film for an electrode of a memory cell (abstract; experimental), it would have been obvious to use a bubbler to deliver the precursor of Example 6 of Baum et al. for forming an electrode for a memory cell because doing so would have been expected to be effective.



With respect to the claims requiring specified flow rates of inert gases for delivering the precursor, this clearly affects the amount of precursor delivered to the process which affects the deposition rate, etc. Therefore, this is a result effective parameter and adjustment of this result effective parameter through routine experimentation for optimization would have been obvious absent evidence showing the criticality of using the claimed flow rates.

Baum et al. are silent as to the deposition times and therefore do not explicitly disclose depositing for the claimed times. However, the amount of time spent depositing the coating and the thickness of the coating that is built up are clearly directly related and the thickness is a function of the intended purpose of the coating. Therefore, adjustment of these result effective parameters through routine experimentation for optimization would have been obvious, absent evidence showing the criticality of using the claimed values.

With respect to claims requiring certain ratios of oxygen to nitrous oxide, Baum et al. disclose that the purpose of the oxidizing gas is to remove carbon to facilitate DRAM production (col. 5, lines 27-47) and the relative amounts of the oxidizing gases in the process would affect this result. As such variation of this result effective parameter through routine experimentation, including to values in the claimed range, for optimization would have been obvious absent evidence showing the criticality of using the claimed values.

Please note that Baum et al. explicitly disclose at col. 7, lines 40-45 that that suitable "chemical vapor deposition conditions" for the platinum deposition "may readily be determined without undue experimentation by those of ordinary skill in the art". These "chemical vapor deposition conditions" would clearly include the reaction pressure, flow rates of reactants and carrier gases, deposition time, ratios of reactants to each other and to carrier gases, etc. The

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examiner maintains, as set forth above, and as explicitly stated by Baum et al. that these conditions are readily determined through routine experimentation for optimization. Therefore, using values within the claimed ranges for these conditions would have been prima facie obvious in the absence of evidence which shows a criticality for using the claimed values.

Claims 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baum et al. (5,783,716) in view of Kwon et al. and Chen et al. (Applied Physics Letters) as applied above, and further in view of Chivukula et al (5,612,560).

The above-cited prior art does not explicitly disclose a thickness of the Pt films. As stated above, however, Baum discloses an intended use of the Pt film as an electrode in a DRAM application (Example 6). Because Chivukula discloses that providing Pt layers having thicknesses in the claimed range provides an electrode for a DRAM capacitor that has improved adhesion to underlying ferroelectric layers (abstract, col. 1, lines 10-15, col. 1, line 60 to col. 2, line 53), it would have been obvious to have provided Pt layers to the thicknesses disclosed by Chivukula so as to provide the advantage of improved adherence of the electrode to an underlying ferroelectric layer in a DRAM capacitor.

***Declaration by Applicant***

Applicant's declaration filed on 15 July 2003 concurrently with the reply brief (Paper 28) has been fully considered but is not persuasive.

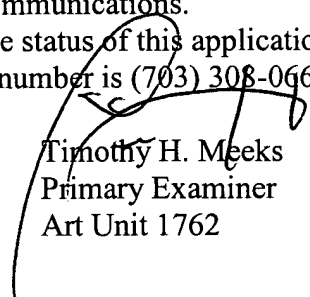
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Applicants state in the declaration at page 4, Items 12 and 13 of the declaration that excessive dilution of the precursor gas can have the detrimental effect of providing poor step coverage which dilution can occur if the oxidizing and/or inert gases are increased beyond a certain limit. These arguments are not found convincing in that they are not commensurate in scope with the claimed process. Specifically, step coverage is an effect related to a substrate having an uneven topography. The claims do not recite such a feature and also are open to any step coverage including the poor step coverage that applicants contend occurs due to "excessive dilution" of the metal precursor. Furthermore, dilution would clearly be dependent upon the amount of metal that is provided in relation to the oxidizer and/or inert gases. The claims do not recite a particular amount of metal precursor to be provided in relation to the flow rate of the oxidizer gases, etc.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy H. Meeks whose telephone number is (703) 308-3816. The examiner can normally be reached on Mon., Tues., Thurs.(6-6:30), Fri.(6:30-10:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P. Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Timothy H. Meeks  
Primary Examiner  
Art Unit 1762

August 18, 2003